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ABSTRACT

The facts that black Americans at all ages have higher blood pressure levels and higher mortality rates from hypertension than whites provided the impetus for this study. In their efforts to discover whether the level of blood pressure within and between black and white groups is related more to stress or to genetic factors, the researchers collected data about health, blood pressure, and perceived life-stress from a Detroit area sample of blacks and whites who live in either high stress or low stress areas of the city. Major hypotheses dealt with the relation of blood pressure to socioecological and medical factors, sociopsychological factors, and heredity. Numerous results are presented which suggest hypothesized relationships with all 3 factors. (TL)

ED057391

Fall, 1971

Progress Report

STRESS, HEREDITY AND BLACK-WHITE BLOOD PRESSURE DIFFERENCES

HE 13329-02 - U.S. Public Health Service

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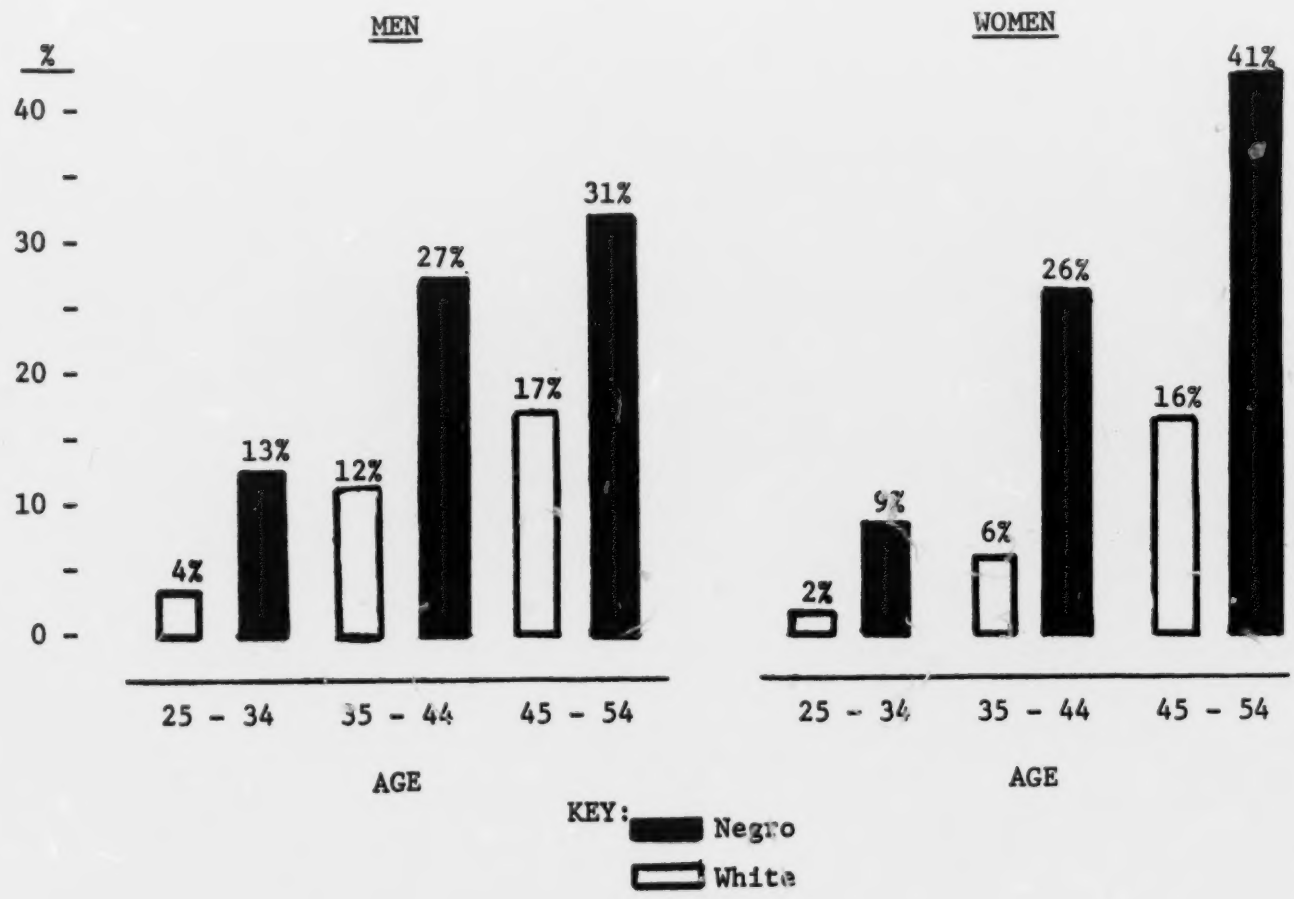
...the survey showed that in every age group the prevalence of definite hypertension (160+ /or 95+) was about two or three times as great for Negro males as for whites, and three or four times more for Negro women than white.[1]



[1] Hypertension and Hypertensive Heart Disease in Adults, United States, 1960-1962. U.S. Department of Health, Education, and Welfare. Public Health Service, Washington, D.C., 1966. National Center for Health Statistics, Series 11, No. 13, p. 14.

BLOOD PRESSURE AND THE RISK OF CORONARY HEART DISEASE: THE FRAMINGHAM STUDY

"An association between hypertension and coronary heart disease is well established...Risk of every manifestation of coronary heart disease including angina, coronary insufficiency, myocardial infarction and sudden death was distinctly and impressively related to the antecedent level of both systolic and diastolic blood pressure. Risk was related not solely to "hypertension" but was proportional to the LEVEL of blood pressure--even at non-hypertensive pressures--from the lowest to the highest recorded." W. B. Kannel, M. J. Schwartz, and P. M. McNamara. (Dis. Chest, Vol. 56, No. 1, July, 1969, p. 51)

Number of family sets by stress area, sex of index person, number, and mean age of set members-Results of nurse-interviewing, October, 1968, to June, 1969.

Family set members	NEGRO								CAUCASIAN								No. of persons interviewed
	High stress				Low stress				High stress				Low stress				
	FAMILY SET WHEN INDEX PERSON IS:				FAMILY SET WHEN INDEX PERSON IS:				FAMILY SET WHEN INDEX PERSON IS:				FAMILY SET WHEN INDEX PERSON IS:				
	Male		Female		Male		Female		Male		Female		Male		Female		
	N	Mean age years	N	Mean age years	N	Mean age years	N	Mean age years	N	Mean age years	N	Mean age years	N	Mean age years	N	Mean age years	
Index person	(58)	40	(55)	41	(61)	39	(56)	40	(55)	40	(62)	41	(58)	43	(57)	44	462
Spouses of index person	(58)	36	(55)	45	(61)	36	(56)	44	(55)	37	(62)	45	(58)	40	(57)	47	462
Siblings of index person	(58)	41	(55)	41	(61)	40	(56)	41	(55)	39	(62)	40	(58)	43	(57)	44	462
First cousin of index person	(58)	41	(55)	41	(61)	40	(56)	42	(55)	39	(62)	41	(58)	43	(57)	45	462
Control persons*	(58)	40	(55)	41	(61)	37	(56)	39	(55)	39	(62)	41	(58)	43	(57)	44	462
Total persons	(290)		(275)		(305)		(280)		(275)		(310)		(290)		(285)		(2310)**
Number of Family Sets	58		55		61		56		55		62		58		57		462

*The control (unrelated person) is matched to the index case by sex, age, race, marital status, census area, and possession of a Family Set.
**The number of persons actually interviewed is about 2500 because 200 persons were part of incomplete Family Sets, i.e., sets in which all five members did not meet design requirements.

STRESS AND HEREDITY IN BLACK-WHITE BLOOD PRESSURE DIFFERENCES: DETROIT

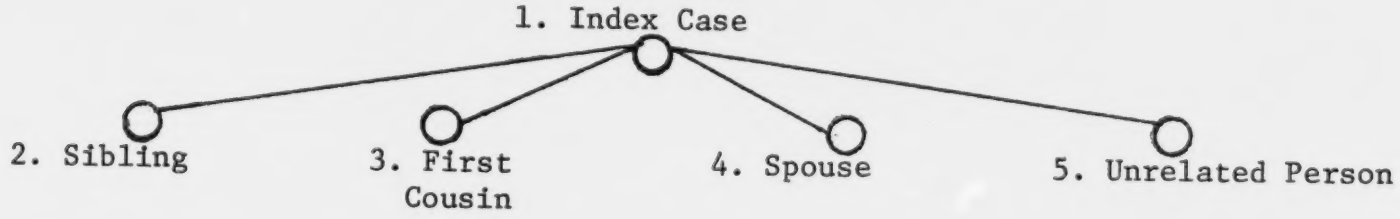
A. Problem: American Negroes have higher blood pressure levels and higher mortality rates at all ages from hypertension than whites. The major questions become: Is the level of blood pressure within and between Black and White groups related more to "stress" or to genetic factors? Or do these factors act together in some measureable way?

B. Study Outline: To answer these questions, the following design was carried out:

1. Ecology: The census tracts of the City of Detroit were ranked in order of their scores on an "ecological stress" index. This index was composed from data in city records measuring the socioeconomic level, crime rate, residential change, family breakdown, and overcrowding in each census tract. The four areas in which the sample was drawn looked like this:

Blacks		Whites	
Low Stress Areas	High Stress Areas	Low Stress Areas	High Stress Areas

2. Genetics: Within each area, all households were censused for persons who were married, between 30 and 54 years of age, and who had a "family set" composed of the following persons:



After verification of each family set member by a trained "verifier," each of 2,310 family set members were visited at their home where blood pressure readings and an interview were taken by a trained nurse-interviewer. (The unrelated person was matched to the index case on area, age, sex, marital status, race, and having a family set. This unrelated person, the sibling, and the cousin were each within 5 years of age of the index case for the 462 Family Sets finally interviewed.)

3. Social Psychology: The interviews measured the amount of life-stress perceived by the individual in 10 content areas, e.g., economic, marital, personal responses to conflict, and so forth.

4. Health-risk Factors: Variables previously found related to blood pressure were also taken into account, e.g., smoking habits, weight, and family history, by a half-hour medical history.

5. Blood-pressure: Taken three times by the trained nurse-interviewer during the first half-hour and twice at the end of the interview, using standardized techniques.

The Departments of Psychology; Human Genetics; and Biostatistics
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Sponsored by the U.S. Public Health Service

PROGRESS REPORT

STRESS, HEREDITY, AND BLACK-WHITE BLOOD PRESSURE DIFFERENCES

(HE 13329-02)

I. Introduction

The three major hypotheses of this Project deal with the relation of blood pressure to socioecological and medical factors, sociopsychological factors, and heredity.

A. Objectives and work accomplished to date.

The stated aims of the analysis of this complex and large data base and work-to-date are as follows:

	Sub-Analyses Work-to-Date	Objectives
1.	Will be done	Description of the population and its subsets
2.	Will be done	Description of the dependent variable, blood pressure
3.	Will be done	Preliminary analysis of the independent variable, the genetic distance scale
4.	Will be done	Analysis of stress areas and blood pressure (excluding attitudinal data)
5.	Will be 50% done Supplement required	Sociopsychological description of stress samples
6.	Supplement required	Analysis of sociopsychological stress and blood pressure
7.	Supplement required	Genetic distance and blood pressure, with "stress" removed
8.	Dropped	Stress as related to the blood pressure categories labeled "normal," "borderline," and "hypertensive"
9.	Delayed: Funded, NIMH	Analysis of the Family Set verification method
10.	Dropped	Preparation for clinical study data collection (four years)

At this point of analysis, two preliminary reports have been delivered:

1) Harburg, E.; Erfurt, J.C.; and Chape, C. Ecological stress areas, anger-guilt and blood pressure: Detroit. Paper presented at the 43rd annual meeting of the Midwestern Psychological Association, Detroit, May 6-8, 1971.

2) Harburg, E.; Erfurt, J.C.; Chape, C.; and Hauenstein, L. Ecological stress areas and blood pressure: Detroit. Paper presented at the first annual Michigan Cardiovascular Research Forum, Michigan Heart Association, Detroit, October 15, 1971.

The first five objectives are in the "write-up" stage. Five articles will be completed by February, 1972. [We are trying to be realistic about our deadlines. One person must process data for the geneticist, the biostatistician, and the social psychologist; this is due to severe staff deletions required by budget reductions]. It is planned that the following three articles be published as a set:

Objective Number	Article
1.	A family set method for estimating heredity and stress. I. Study design and sample Lead author: Dr. E. Harburg
2.	A family set method. II. Blood pressure by race, sex, and stress areas: Detroit, 1968-69. Lead author: Dr. M. Anthony Schork
3.	A family set method. III. Heritability and blood pressure. Lead author: Dr. W. J. Schull

The following two articles will be submitted separately to different journals:

4.	Socioecological stress and blood pressure: Detroit, 1968-69. Lead author: Dr. E. Harburg (see Progress Report, Report #1)
5.	Socioecologic stress, anger-guilt, and blood pressure: Detroit, 1968-69 Lead author: Dr. E. Harburg (See Progress Report, Report #2)

II. Summary Results of Socioecological Hypothesis

1. Blood pressure does appear to vary with "socioecological niches" or combinations of sex, race and residence, which reflect social class position as well as degree of social stressor conditions. Black High Stress Males had higher adjusted levels than Black Low Stress Males, while White High Stress Females had higher adjusted pressures than Low Stress Females. Black High Stress Females had significantly higher Observed levels than Black Low Stress Females. Cross-race comparisons showed that for Systolic Black Low Stress Males did not differ from White Low Stress Males. Black Low Stress Males had higher diastolic readings than White High Stress Males but this difference disappeared when Socioeconomic Status was covaried; then Black Low Stress men did not differ from White High Stress men.

2. Black High Stress Males had a significantly higher percent of Borderline and Hypertensive blood pressure than other male race-area groups; White Low Stress Females had the lowest of all eight sex-race-stress area groups.

3. For Black Males, the younger, overweight High Stress residents had significantly higher Borderline and Hypertensive levels than did a similar subgroup in their Low Stress counterparts. Further, for both groups, Being Raised in Detroit (not migrating from elsewhere) was related to higher readings.

4. Again for Black Males, Skin-Color was directly related to pressure, such that the darker the skin, the higher the readings. Unexpectedly for Whites, Females more than Males, a weak relationship appeared to show that the lighter the skin-color, the higher the blood pressure.

5. For Females, Family Income was related to blood pressure, conditioned by ethnicity. Thus for Black Females, the lower the income, the higher the pressure; while for White Females, the higher the income, the higher the blood pressure. This latter result was weak.

6. For Females, regardless of race or area, smokers had higher blood pressures than non-smokers. This held within each Age-Overweight category for Black Females; but, for White women, only Smoking and being Overweight together showed a trend to higher levels.

7. For all eight social groups, Age and Overweight were directly related to levels; however this varied by group. The relationship was lowest for both variables for Black Males; but for White Low Stress Females, who had the lowest average blood pressure of all groups, the relationship of Overweight and pressure was the strongest. It must also be noted that Black High Stress Females had the highest Percent Overweight and Black Low Stress Females had the same percent as the White Females.

8. In all groups, there was some relation f parental high blood pressure history and offspring's pressure. The same-sex parent history was related to the pressures of Whites, but the cross-sex parent was significant for Blacks. Errors of reporting are unknown.

9. For Males, a weak relationship was noted between blood pressure and days in the early, work-week from Monday to Thursday. For Females, a negative relation of readings and Amount of Medical Contact was observed; the higher the pressure, the less amount of contact. For certain groups, across race and sex, Rated Tension at readings, Number of Hours Since Last Meal, the Time of Interview (from early to late), and Season of Year (from Spring, Fall to Winter) were all weakly related to blood pressure after the effects of Age and Overweight and other more strongly related variables, already mentioned, had been removed.

As a final note on "artifacts," for White Males only (data not shown), the less cooperative (as rated by Nurse after interview), the higher the pressure--again, weak but significant.

III. Summary Results of (Initial) Sociopsychological Hypotheses

The results tend to support the "suppressed-anger" hypothesis and its corollaries. Diastolic blood pressure was generally higher for respondents who said they would hold their anger in, who said they would feel relatively more guilty at being angry, and who said they would leave or remain quiet rather than protest at unfair treatment. This finding was stronger for some groups than for others, and stronger for some anger-guilt items than others, but there was a persistent association between diastolic blood pressure and the three anger-guilt elements of suppressed anger, guilt, and lack of protest.

Trends. Study of Figures 1 and 2 shows how consistently the higher diastolic blood pressure means fell to the respondents categorized as Anger In, More Guilt, and No Protest. Table 1 gives the magnitude of the trend for each anger-guilt variable.

Table 1. Trends, anger-guilt items: Number of social groups following majority trend for each variable (highest possible number: 8)

Attacking Person	Anger In> Anger Out	More Guilt> Less Guilt	Leave/Quiet> Protest
Spouse	7	7	5
Housing	6	6	5
Police	7	7	5
Father	4	7	6
Mother	5	4	5
Boss	5	7	7

Thus, even though many of the differences between the means shown in Figures 1 and 2 are not significant, together they add up to a very strong trend in the suppressed-anger direction, remarkably consistent over the six situations as well as the three responses, especially for Black High Stress Males and Females and White High Stress Males.

Figure 3 further shows the complex "interaction" of anger and guilt to blood pressure for two situations for Males in four race-area groups. Responses of two groups - Black High Stress and White Low Stress - support the hypothesis. But for White High Stress Males, Guilt by itself as more associated with levels, while Black Low Stress Males who deny feeling guilty after anger and who also report keeping anger-in have higher levels. The patterns for Females are equally complex but also related to pressures.

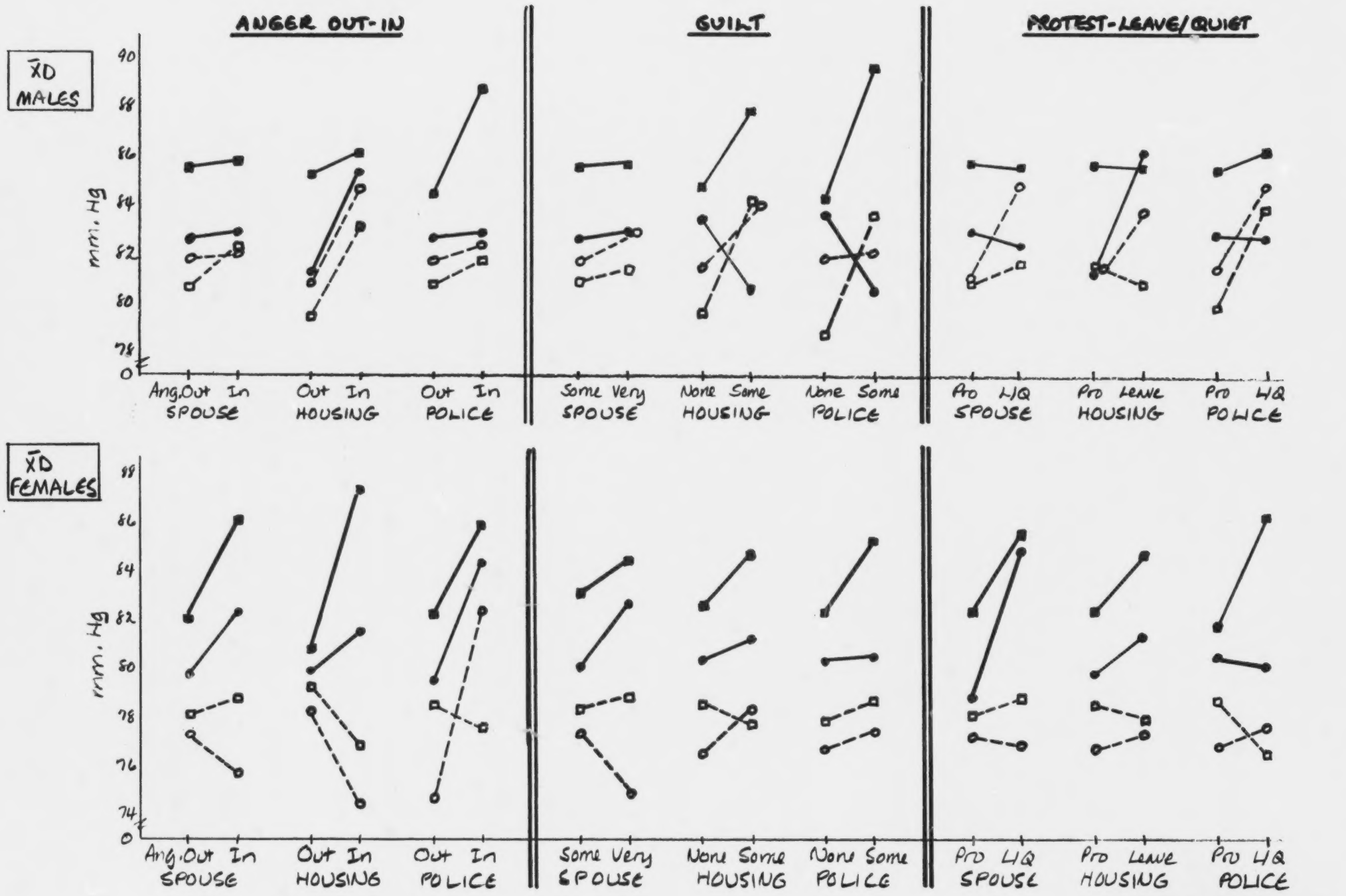


Figure 1. Mean diastolic blood pressure: anger-guilt response in the Spouse Anger, Housing Discrimination and Police Anger situations.

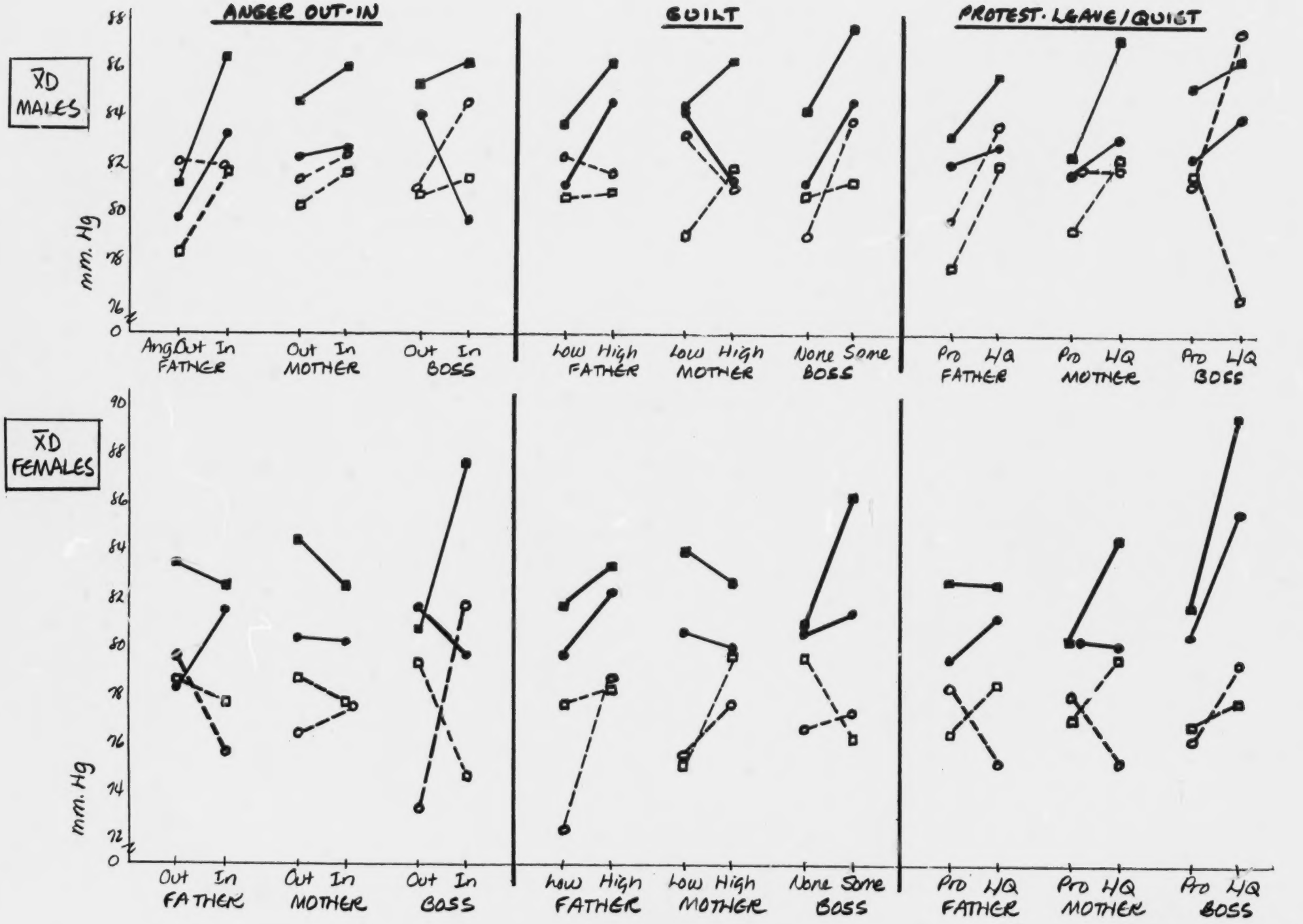
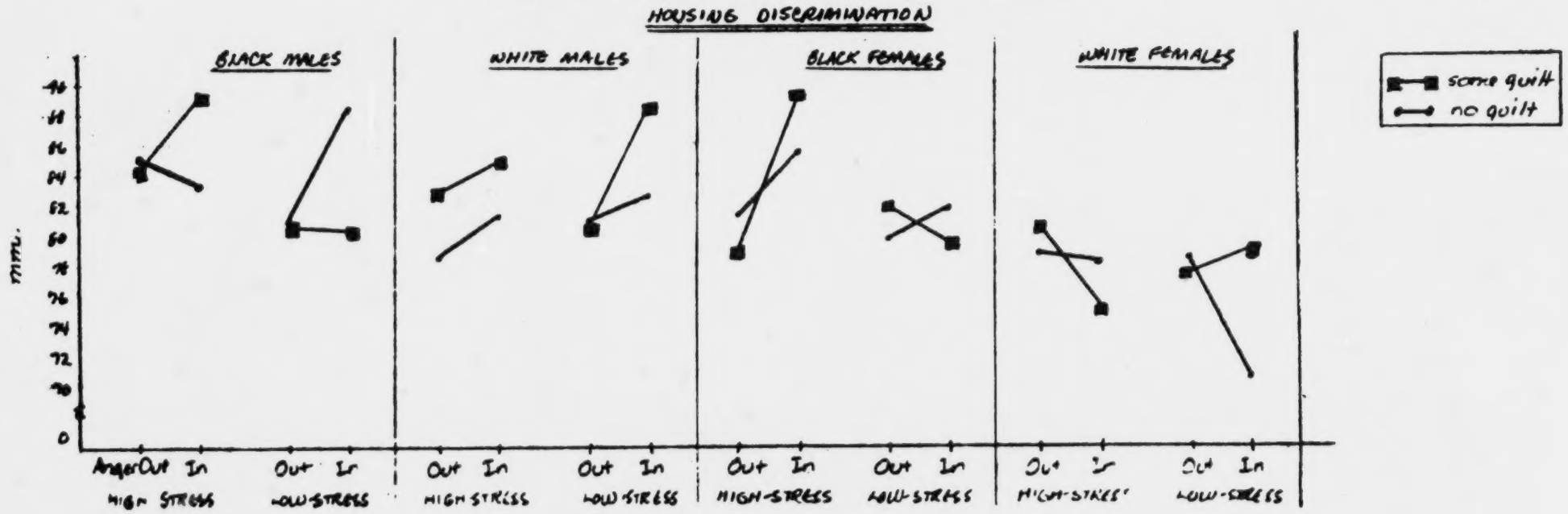
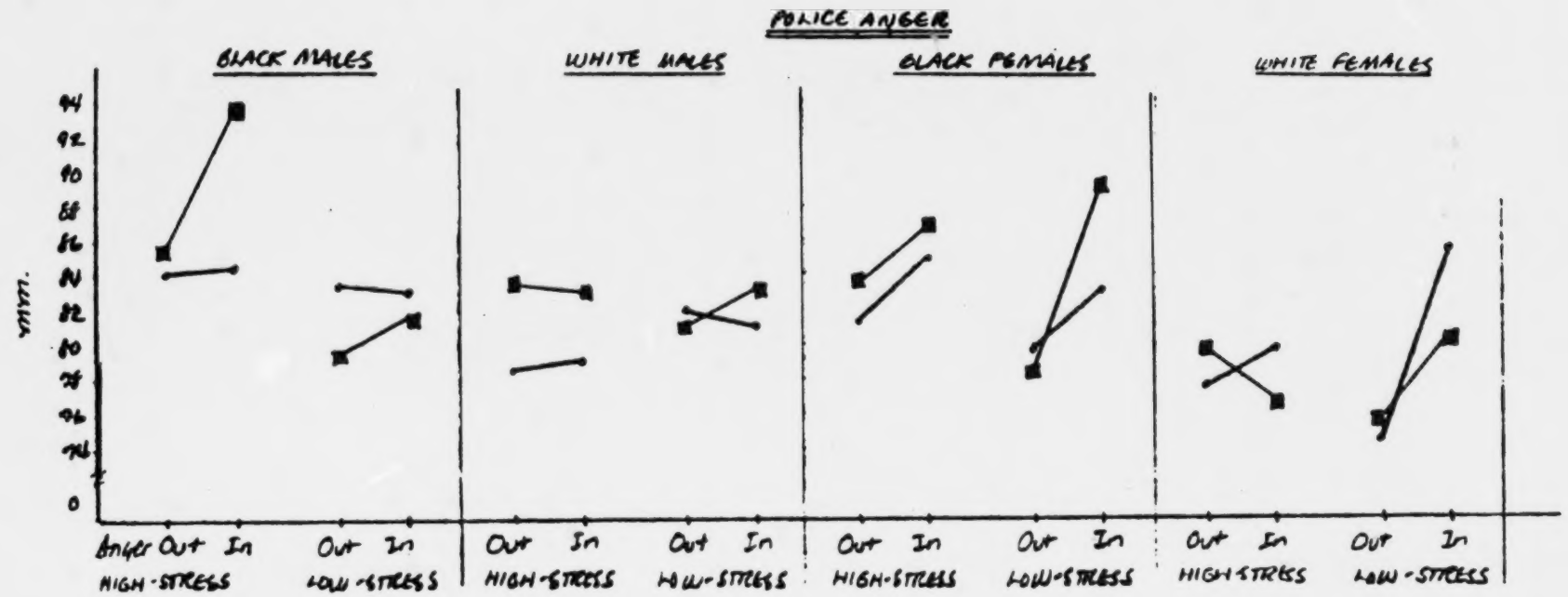


Figure 1. Mean diastolic blood pressure: anger-guilt responses in the Father Anger, Mother Anger, and Boss Anger situations.

Figure 3 MEAN DIASTOLIC BLOOD PRESSURE - OBSERVED MEANS

DHR 1.0
TS 1,5





IV. Summary Results of (Initial) Hereditary Hypotheses

A. Blood Pressure Comparisons

Most timely, a colleague has utilized our data for comparison purposes in a recent unpublished manuscript (Lillian Gleibermann, "Population variation in blood pressure and essential hypertension with particular reference to people of African descent.") She has kindly consented to allow our use of these charts for this report. Figures 4 and 5 show that the "Detroit" data for Blacks, by inspection, seem to closely resemble United States Public Health Service survey and an Urban New England (Northern) population more than the Southern samples. The similarities are even greater for Whites across studies.

B. The Genetic Component of Blood Pressure--Interim Progress

Table 2 shows the results of the combined or cross family set regressions of selected variables on the Genetic Distance Scale, for family sets including the spouse of the family set. Results, not shown, with Family Sets excluding the Spouse, show similar Betas, as the genetic and sampling models would assume, i.e., the Spouse and Unrelated should have the same "relative" relationship to Index. Each is considered to be 100% dissimilar in genetic origin from the Index, and, in sampling, the Spouse residing with the Index and the Unrelated Person in the neighborhood (with "sex" adjusted for) should be equivalent and interchangeable empirically. The results confirm these assumptions.

It should also be noted in Table 2 that all the marker elements have significant relations to the Genetic Distance Scale (GDS), as the simple correlations and inspection of $\bar{X}$ $|d|$-scores and their standard deviations would lead one to expect. Unexpectedly, however, the data also show significant Betas between the GDS and Weight for Blacks and Whites and Weight at 20 years old for Whites. In so far as Weight is known to be environmentally varied, this finding deserves further study. The Beta of GDS and Smoking for Blacks may be fortuitous, but also bears further study. In Report #1 (Socio-Ecological Stress and Black-White Blood Pressure: Detroit) it was found that Weight and Smoking were related to blood pressure for Black Females.

Another important result occurs for the F-ratios of GDS and blood pressure variables. For Blacks, adjusting blood pressure for error (E) and then error and health risk (EHR) produces a decrease in strength of relationship; for Whites, the same process produces an increase in size of relationship. The latter result urges us to develop the more sophisticated 16-cell model for adjusting the blood pressure distributions in order to maximally "remove" the variance of environmental factors from blood pressure, and thereby have a "cleaner" test of the Genetic Distance Scale to variations in pressure.

Figure 4. BLOOD PRESSURE IN AMERICAN POPULATIONS: BLACK MALES

9-27-71
L. Gleibermann

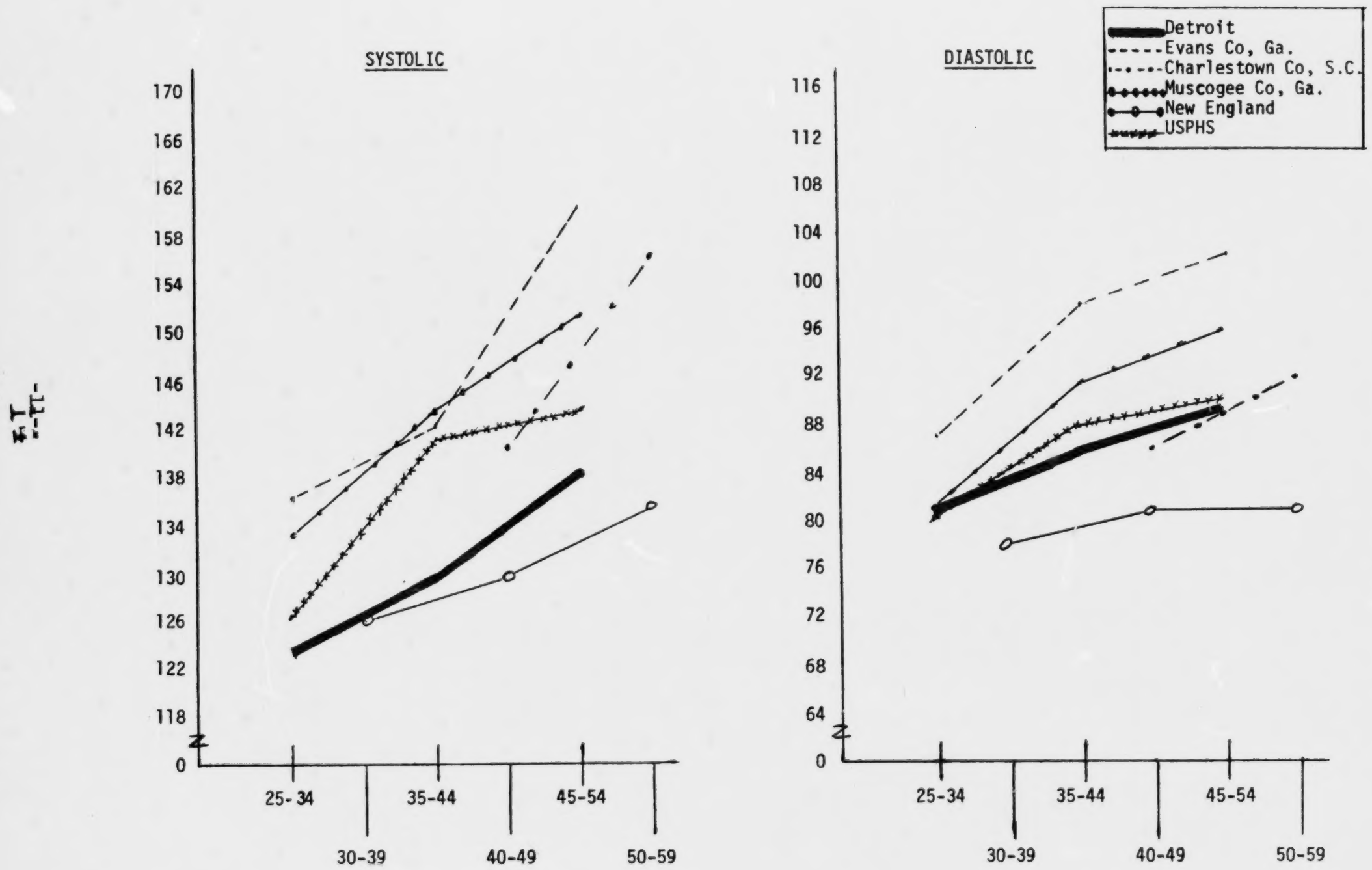


Figure 5. BLOOD PRESSURE IN AMERICAN POPULATIONS: WHITE MALES

9-27-71
L. Gleibermann

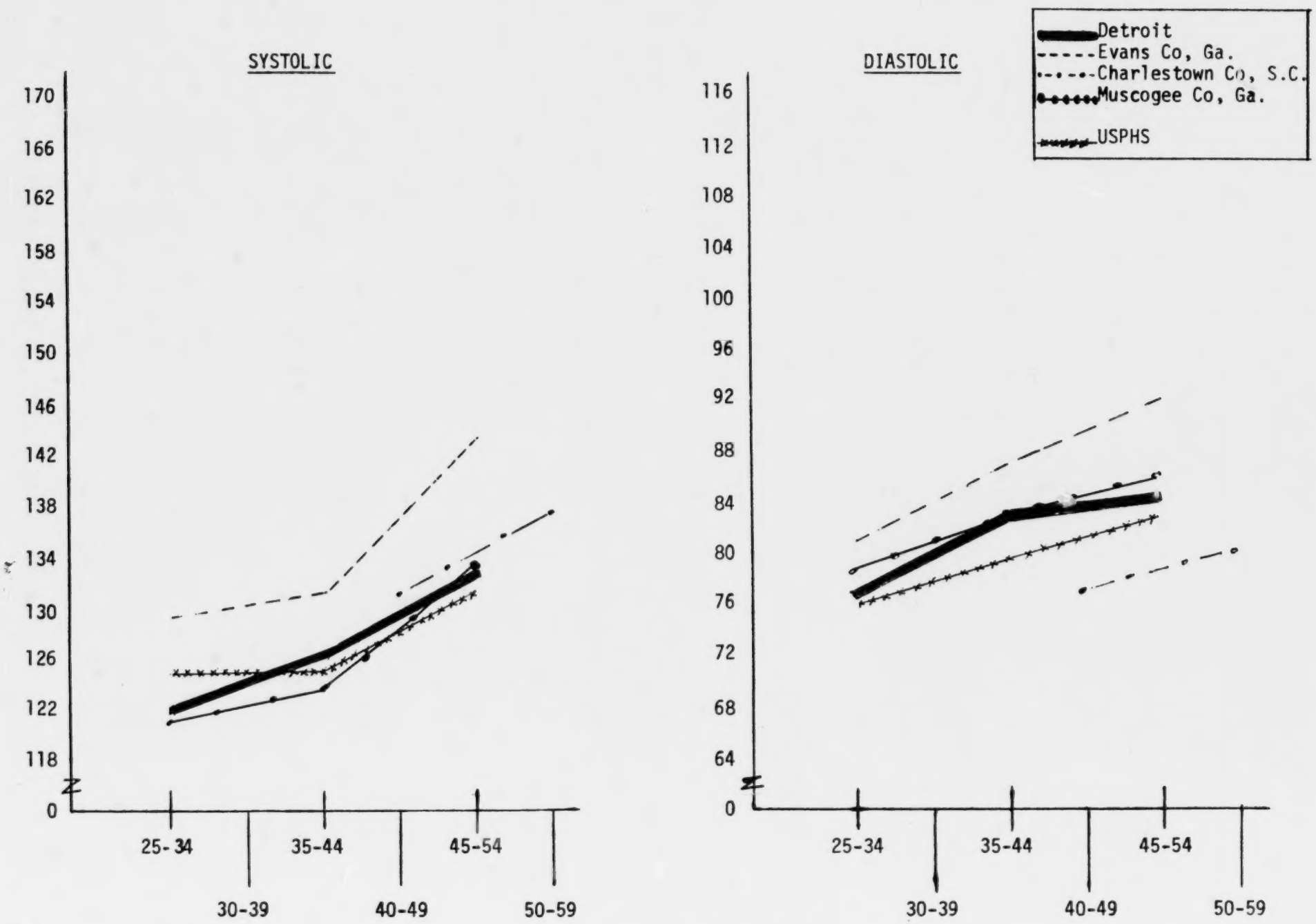


Table 2. Regressions of Genetic Distance Scale on 9 Blood Pressure and 15 Marker Variables (|d|-scores) for the Genetic Sample by Race[a] (GSF 2,3,4,5)

|d|- Physical Variables Sex-Adjusted	Total (N = 1844) B	b	F	Black (N = 916) B	b	F	White (N = 928) B	b	F
Marker									
1. Height	.13	1.37	32.6	.10	1.01	9.2	.16	1.71	25.0
2. Weight	.10	11.19	17.1	.09	10.74	7.6	.10	11.64	9.5
3. 4 pt. Skin Color	.09	.29	14.8	.15	.48	20.1	.03	.11	.9
4. 12 pt. Skin Color	.11	.94	22.4	.16	1.60	24.9	.04	.29	1.8
5. Hand Width	.12	2.36	25.3	.12	2.50	14.4	.11	2.23	11.2
6. Little Finger	.10	1.98	19.7	.08	1.77	6.6	.13	2.18	15.1
7. Ring Finger	.12	2.34	27.9	.10	2.14	9.9	.15	2.54	20.6
8. Middle Finger	.13	2.74	32.6	.11	2.42	10.8	.16	3.05	25.7
9. Index Finger	.11	2.37	22.8	.09	1.97	6.9	.14	2.76	18.9
Other									
10. Weight at 20	.08	7.25	12.7	.07	5.52	3.9	.10	8.96	9.1
11. % Overweight	.07	5.40	7.8	.06	4.79	3.0	.07	6.01	4.9
12. % Overweight at 20	.03	1.97	2.1	.02	1.04	.3	.05	2.90	2.3
13. % Overweight - % Overweight at 20	.04	2.82	2.9	.05	3.26	1.9	.03	2.40	1.1
14. Pulse $\bar{X}$ (1 - 3)	.01	-.35	.1	-.02	-.86	.3	.00	.15	.01
15. Smoking	.03	.23	2.0	.08	.51	5.3	-.00	-.04	.02
Blood Pressure |d|-Variables									
1. $\bar{X}$ BP (1 - 3) Sys.	.02	.16	0.78	.01	.93	.10	.03	2.36	1.02
2. $\bar{X}$ BP (1 - 3) Dias.	.04	.23	3.73	.08	4.27	5.58	.01	.27	.04
3. 4 Categories Sys.	.03	.09	1.28	.01	.06	.20	.04	.14	1.38
4. 4 Categories Dias.	.03	.14	1.40	.04	.20	1.27	.02	.09	.29
5. 4 Categories S/D	.03	.11	1.21	.03	.13	.68	.02	.10	.53
6. $\bar{X}$(1 - 3) BP(E) Sys. (S)[b]	.01	.48	.07	.00	.07	.00	.01	.88	.15
7. $\bar{X}$(1 - 3) BP(E) Dias. (S)	.02	1.01	.80	.06	3.25	3.52	-.03	-1.19	.68
8. $\bar{X}$(1 - 3) BP(EHR) Sys. (S)	-.01	-.62	.13	-.01	-.70	.07	-.01	-.54	.06
9. X(1 - 3) BP(EHR) Dias. (S)	.00	.12	.01	.03	1.61	.98	-.03	-1.34	1.02

[a] $F \leq 2.75$; $p < .10$: $F \leq 3.92$; $p < .05$: $F \leq 5.15$; $p < .02$: $F \leq 6.85$; $p < .01$

[b] (S) refers to sex-adjusted variables

V. Acknowledgments

Names and titles of people consulting or affiliated with this project appear in Figure 6. A project as large as this must necessarily draw on the knowledge and skills of many agencies and persons, Acknowledgments of support to all are not possible; therefore the following account is partial and chronological.

Initial support in the form of seed money from the Office of Research Administration at The University of Michigan was critical in allowing this project to start. Dr. Jeremiah Stamler's critique and support have been invaluable since the Project's beginning. Dr. Samuel Fox's encouragement, funds from the Center for Chronic Disease Control, Public Health Service, and Mr. Robert Thorner's administrative skills within this Center, made the Pilot Survey viable.

Local resources of The University of Michigan in Ann Arbor have also been utilized in various ways with an equally high degree of cooperation. Mr. Cottrell, Controller, made administrative arrangements which allowed requisite flexibility of operations. Informal consultation with a core group of authorities in ecology, biostatistics, hypertension, survey methods, sampling, and human genetics has been established for the duration of the Project. The computer facilities of The University of Michigan, the Institute for Social Research, and Wayne State University, including program consultation, have been used extensively.

Cooperation from local agencies in Detroit has been superb. The Visiting Nurses Association and the City Department of Health were most helpful in recruitment, and in solving minor problems. The City of Detroit, Department of Police, has furnished through its statistical units all the crime and delinquency records requested, in an efficient and most pleasant manner. The Mayor's Committee for Community Renewal Program has been most helpful in every request for data, maps, etc., made by Project Personnel. Wayne State University campus facilities and graduate students' aid were arranged by the Department of Sociology and Anthropology, which also allowed use of a field office in the department, and appointed the Project Director an Adjunct Professor. Wayne State University provided facilities for training purposes, and facilitated administrative matters. Other agencies aiding the Project were the City of Detroit Planning Commission and the Metropolitan Services Agency. Many persons in Detroit have been consulted on a variety of problems, and all have freely given of their time and ideas. Mr. Eugene Beauregard helped initiate the field work in the Pilot Survey. Mr. William Ash has served as an excellent Mathamatician programmer.

The public health nurses who actually collected the data through snow, rain and high stress areas did an excellent job, guided by two superb nurse-supervisors: Mrs. Mildred Harvin (Pilot Study) and Mrs. Revera Munce (Major Study).

Our Detroit Advisory Committee must be thanked for their time, helpful criticisms and support.

Finally, we must express our appreciation for additional grants of support from the Michigan Heart Association at critical periods of work.

Figure 6

STUDY OF STRESS AND HEREDITY IN NEGRO-WHITE HYPERTENSION

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Mayor's Committee for Community Renewal

REFERENCES

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DARK SKIN HEIGHTĖNS RISK

Color Linked to Hypertension

BY DOLORES KATZ
Free Press Medical Writer

Black skin has been linked to high blood pressure in a study by a University of Michigan social psychologist who found that the blacker the skin, the higher the blood pressure.

The most recent results of a continuing study of four segregated Detroit neighborhoods showed a relationship between dark skin color and high blood pressure among some 800 blacks tested, according to Ernest Harburg, director of the study.

Nobody knows why. The reasons could be due to heredity, environment, or both.

Scientists have known for some time that more American blacks suffer from hypertension than whites, that more blacks die from its effects and that they die at an earlier age than whites.

But Harburg's long-term study, financed by grants from the Michigan Heart Association and the U.S. Public Health Service, is one of the first to offer evidence that the reasons may be environmental rather than genetic.

In an earlier report, Harburg noted that blacks living in "high-stress" areas—neighborhoods where crime and unemployment are high, but education and income are low—were more likely to have high blood pressure than whites who live under similar conditions.

THE FIRST STUDY suggested that the key to the greater rate of high blood pressure among poor blacks might be the suppressed anger and guilt that have characterized the urban blacks' responses to white discrimination.

"Suppressed anger and guilt and high stress equal high blood pressure," Harburg had said.

In his second report, Harburg compared the skin color and blood pressure of whites and blacks in high-stress areas with those in low-stress areas — neighborhoods where crime is low and income and education are high.

The study found that there was a tendency for darker-

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skinned blacks to live in the worst parts of the city and to be less educated, with poorer jobs and lower income.

It was this data that pointed to the higher blood pressure among the darker-skinned blacks being related to the environment. The more black one was, the more likely he was to live in a bad neighborhood, and thus, the greater the chance for him to have higher blood pressure, according to the study.

But the study also showed that dark-skinned blacks in better neighborhoods had higher blood pressure, too — higher than light-skinned blacks in the same area. This could mean the blood pressure factor was due to biological differences.

And the study made another surprising observation: Among white women the skin color and blood pressure relationship is reversed. Lighter-skinned white women have a very slight tendency toward higher blood pressure than white women with dark skins.

HARBURG drew no conclusions from these findings.

"It's difficult at this time to determine which is more important (heredity or environment)," he said.

"There's no way of knowing whether higher blood pressure among dark-skinned blacks is due to social class prejudice or to a genetic factor."

The three-year research project focused on neighborhoods in Detroit's Twelfth St. area, where the 1967 riot began; in the northwest; in the extreme northwest; and in the southwest.

The Twelfth St. neighborhood was selected as a high-stress black area. The northwest area represented a black low-stress area, where middle-class blacks made up 75 percent of the population. The extreme northeast and the southwest were examples of low-stress and high-stress white neighborhoods.

RESEARCHERS from U-M and Wayne State University interviewed and checked the blood pressure of 250 married couples in each area.

Other findings of the study show that:

- Being raised in Detroit is a hazard. Black males who were raised in Detroit had higher blood pressure than blacks who had migrated to the city.
- The older (over 40), dark-skinned black male who was reared in Detroit had the highest blood-pressure reading of all groups.
- Being overweight and over 40, regardless of race, is a dangerous combination; high blood pressure is closely related to these two factors.
- Family income has a definite effect on women's blood pressure, but the effect is different for each race. Black women's blood pressure goes up as family income goes down, but for white women, the reverse is true: The higher the income, the higher the blood pressure.
- Among women, the less they see a doctor, the higher their blood pressure.